



Stop Gambling with Gaia! **A Briefing Paper on Geoengineering for Delegates to the UN Climate Negotiations in Barcelona**

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The idea of re-engineering the planet used to be the stuff of science fiction, but a band of increasingly vocal corporate advocates for geoengineering is rapidly moving these controversial ideas from the margins to the mainstream of policy response to climate change. Some advocates are contemplating including geoengineering in the United Nations Framework Convention on Climate Change negotiations. Others are waiting for Copenhagen negotiations to fail in order to create a political opening for a high-risk Plan B: a climate techno-fix.

Seen alongside the full set of possible and urgent responses to anthropogenic climate change, geoengineering is the wrong avenue, towards which further political will and resources should not be squandered. Our research suggests that all geoengineering technologies, by virtue of being large-scale, highly centralized and having commercial applications as well as latent military uses, will always deliver inequitable outcomes. The illusion of a “techno-fix” just around the corner serves as an all too convenient excuse for industrialized countries to drag their heels and continue avoiding the urgent changes required to reverse the climate’s trajectory.

What is geoengineering?

Geoengineering is the intentional, large-scale manipulation of the earth’s climate systems by artificially changing oceans, soils and the atmosphere. Put simply, geoengineering is a technological fix on a planetary scale - one that may have devastating environmental, economic and social impacts, particularly in the global South which is already suffering most from the impacts of rapid environmental change and will have least say in how such technologies are deployed.

ETC Group or Action Group on Erosion, Technology and Concentration

ETC Group is dedicated to the conservation and sustainable advancement of cultural and ecological diversity and human rights. To this end, ETC Group supports socially responsible developments of technologies useful to the poor and marginalized and it addresses international governance issues and corporate power. ETC Group works in partnership with civil society organizations (CSOs) for cooperative and sustainable self-reliance within disadvantaged societies, by providing information and analysis of socioeconomic and technological trends and alternatives.

- Geoengineering is a radical and risky “Plan B” that countries responsible for climate chaos have stuck in the back of their briefing books - ready for use as a negotiating tool if needed. This paper provides essential background on recent developments in the field, a summary of some of the potential risks and consequences, and recommendations on how the negotiations on technology in the UNFCCC should deal with geoengineering questions, to ensure that the global South is not circumvented in decision-making.

Why does geoengineering matter in UN climate negotiations?

- The geoengineering lobbyⁱ, composed in large part of industrially-funded think tanks who have fought emissions reductions policy, will use the UNFCCC to mainstream geoengineering as a “solution” that is faster and cheaper than mitigation. They will push for public funding and permission for real-world experimentation.
- The word “geoengineering” does not (yet) appear in the negotiating text but geoengineering technologies could be inadvertently (or intentionally) included under the draft text on Enhanced Action on Development and Transfer of Technology Language could also be proposed which would allow countries to meet emissions targets by managing solar radiation or atmospheric removal of greenhouse gases.
- Alarming, some geoengineering advocates may try to use the multilateral negotiations to mandate further research and development of specific schemes and to have them accredited under the clean development mechanism (CDM), or even promote deceptive wording on mitigation, agriculture, and technology “enhancement”. Delegates should be wary of language on technology that is so broad and all-encompassing that even the most outlandish geoengineering schemes could be inadvertently sanctioned. Examples of these technologies are provided below.

As shown recently by a series of carefully timed meetings and reportsⁱⁱ, and even occasional statements by officialsⁱⁱⁱ, geoengineering is being actively positioned as an additional tool amongst the possible policy responses to climate change. Geoengineering seems like an ideal platform for countries that are unwilling to reduce fossil fuel consumption, refuse to effectively mitigate global warming or adequately fund adaptation.

For South negotiators, geoengineering is a very bad deal with no democratic debate, no multilateral forum in which critical decisions can be made and unpredictable and potentially devastating implications on health, the environment and global poverty.

What kind of technologies are we talking about?

There are three broad categories of geoengineering technologies currently in research and development in Northern academic, public and private settings. The most prominent of these technologies are:

Solar Radiation Management (SRM)

- Aerosol sulphates in the stratosphere: Pumping aerosol sulphates into the stratosphere to block sunlight, thereby lowering the earth’s thermostat without reducing the level of greenhouse gases (GHGs) in the atmosphere.

- Cloud whitening: Spraying seawater through unmanned ships to make clouds “whiter” by increasing the condensation nuclei in clouds, thereby reflecting more of the sun’s rays back to space.
- Space sunshades: Trillions of small free-flying spacecrafts launched a million miles above the earth or space mirrors, made from a reflective mesh of aluminum threads and placed between the Earth and sun.
- Albedo enhancement: increasing the reflectiveness of the Earth’s surface by planting whiter crops, painting roofs and roads, or covering desert regions with white material.

Implications: Solar radiation management (blocking or reflecting sunlight) has the potential to cause significant environmental damage, including releasing additional greenhouse gases into the atmosphere, changing weather patterns and reducing rainfall, damaging the ozone layer, diminishing biodiversity, making solar power less effective, allowing ocean acidification to proceed unhindered, and provoking sudden climatic jumps if stopped. Even more critically – who controls the earth’s thermostat? Who will make the decision to deploy when such drastic measures are considered technically feasible?

Carbon Dioxide Removal and Sequestration

- Ocean fertilization: Stimulating the growth of phytoplankton with iron or nitrogen in order to promote carbon sequestration deep at sea. There have already been more than a dozen experiments and 191 states at the Convention on Biological Diversity adopted a *de facto* moratorium on the practice in May 2008. The UN General Assembly and the London Convention and Protocol have also debated the matter cautioning against further deployment.
- Ocean upwelling or downwelling enhancement: Using giant pipes to bring up nitrogen or phosphorous enriched waters (relative to carbon) to the surface to cool surface waters and enhance ocean sequestration of CO₂.
- Genetic engineering of algae: Genetically engineered algae, covering urban buildings, open ponds, or the surface of the ocean would be used to capture carbon dioxide.
- Carbon-sucking machines or synthetic trees: Extracting CO₂ from the air by using liquid sodium hydroxide (or another “proprietary sorbent material”^{iv}), which is converted to sodium carbonate, then extracting the solid carbon dioxide to be buried.
- Biochar: Burning huge quantities of biomass through pyrolysis (low oxygen) and burying the concentrated carbon in soil, a proposal backed by the corporate-driven International Biochar Initiative.
- Carbon capture and Storage: This umbrella heading can include many different technologies, some of which are clearly considered geoengineering (biochar for example) and others, which are highly problematic from an environmental perspective, but are less frequently considered geoengineering (such as capturing CO₂ at source and storing it in geologic formations).

Implications: When used at a large scale these technologies which all attempt to remove carbon dioxide from the atmosphere once it has been emitted can cause destruction or intentional modification of complex ecosystems and are therefore likely to cause unpredictable side effects. The duration and the safety of sequestration in land or sea (whether through biological or mechanical means) are mostly unknown; and many of these techniques require unsustainable inputs or land/ocean use changes which will negatively affect poor and marginalized people.

Weather modification

- Cloud seeding (for rain) has been used for forty years both as a military technique to make enemy troop movement difficult and for agriculture. Patent claims are already pending on unproven technologies for hurricane suppression or redirection.

Implications: Weather modification techniques, first used for military purposes and now by US state governments in California and Texas, attempt to provoke rain, divert hurricanes and modify the temperature locally. They have unpredictable and potentially devastating global and regional impacts. Weather modification has also been advanced as an adaptation technology for climate change (eg for protecting waterflow for hydropower schemes^v).

What is wrong with Geo-engineering?

- **The perfect excuse:** Geoengineering offers governments an option other than reducing emissions. Geoengineering research is often seen as a way to “buy time”^{vi}. For some industrial advocates it is a means to avoid action on emissions reduction.
- **Large-scale:** For any geoengineering technique to have a noticeable impact on the climate it must be deployed on a massive scale thereby obliterating any possibility of effective local, national or regional climate policies.
- **Unequal:** OECD governments and powerful corporations -- who have denied or ignored climate change for decades (and are responsible for 90% of historic emissions) -- are the ones with the budgets and the technology to execute this gamble with Gaia. There is no reason to trust they will have the interests of more vulnerable states or peoples in mind.
- **Unilateralism:** Many geoengineering techniques appear relatively simple and cheap to deploy and the technical capacity to do so will be within the hands of those who possess the technology (individuals, corporations, states) in the next ten years. It is urgent to develop a multilateral mechanism to ban such unilateral attempts at climate modification.
- **Unreliability:** Geoengineered interventions could easily have unpredicted consequences due to mechanical failure or human error, inadequate comprehension of the earth’s climate, unpredicted natural phenomenon, irreversibility or funding problems.
- **Regional risks:** Geoengineering side effects are unknown and some proposed schemes are likely to provoke unpredictable disruptions to the climate system, such as precipitation disturbances and even drought in Asia and Africa that could be caused by some SRM techniques.
- **Treaty violations:** Many geoengineering techniques have latent military purposes and their deployment would violate the UN Environmental Modification Treaty, which prohibits the hostile use of environmental modification.
- **Commercializing the climate:** Competition is already stiff in the patent offices between those who think they have a planetary fix for the climate crisis - but should “Plan B” ever actually be designed, the prospect of it being privately held is terrifying.
- **Carbon profiteering:** No commercial involvement or profit should be allowed to interfere with research and development of such serious planet-altering technologies. If geoengineering is actually a “Plan B” in case of a climate emergency, then there is no way that it should be considered for carbon credits under the CDM or as any other means of meeting emissions reductions targets.

Oversight (or lack thereof)

- There is **no multilateral body** specifically mandated to take on the governance and regulation of emerging technologies like geoengineering, making the world into a “Wild West” where anything goes for those with the money and capacity to act.

- **Who decides what techniques get deployed and under what conditions?** Geoengineers who have the technical and economic means to fiddle with the global thermostat will do it – and in the absence of a multilateral debate will even define what constitutes a “climate emergency”^{vii}. Recent governance proposals, including a “voluntary code of practice,”^{viii} rather than a binding and globally agreed upon set of rules, make a mockery of any notion of accountability.
- In the absence of a global consensus, **support for geoengineering technologies would be irresponsible**, reinforcing the lack of accountability of industrialized countries for climate change and worsening negative consequences on the global South.

What to watch out for

Geoengineers and their supporters will not ask for blanket endorsement of these technologies in the UNFCCC. Rather, they will urge governments to:

- Generously fund geoengineering research and development.
- Green-light real-world experimentation (perhaps according to a voluntary code of practice).
- Adopt vague and open-ended language on technology financing, research and development, and technology action plans, leaving the door open to funding geoengineering.
- Adopt language allowing for solar radiation management to be considered as meaningful action alongside emissions reductions.
- Advocate strong protection for intellectual property on all technologies.
- Ensure there is no process to assess or evaluate policies related to technology.
- Adopt weak (or no) institutional arrangements to evaluate and regulate climate technologies.

What we need

UNFCCC, in collaboration with other multilateral organizations, should adopt a multilateral mechanism for the assessment and regulation of new and emerging technologies based on the following principles:

- Strict application of precautionary principle -- too much is at stake
- Respect for international law
- Ensuring environmental integrity
- No unilateralism
- Full consideration of potential negative social or environmental impacts
- Open and transparent process with full civil society participation
- Fair, full and equitable representation and participation of developing countries
- Involvement of relevant UN treaty bodies

What we need to see on Technology

Geoengineering requires multilateral discussion and regulation, not rapid enhancement and deployment. For that reason, it needs to be specifically excluded from the provisions currently under discussion in the Chapter on Enhanced Action on the Development and Transfer of Technology. ETC Group proposes the following language:

“No provisions relating to technological enhancement, research, development, diffusion, deployment will apply to the large-scale, intentional manipulations of the earth’s climate through geoengineering, including solar radiation management, carbon dioxide removal technologies and weather modification.”

- New adaptation or mitigation technologies which involve the intentional and large scale manipulation of the earth's climate and related systems such as geoengineering technologies are excluded from the technology enhancement measures foreseen in UNFCCC Article 4. The precautionary principle should be strictly applied, especially in light of potential transboundary impacts in accordance with principle 21 of the UN Declaration on the Human Environment (Stockholm, 1972). Real world experimentation and deployment of geoengineering without explicit multilateral consensus are prohibited.

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For more background information see <http://www.etcgroup.org/en/issues/geoengineering.html>

ENDNOTES

ⁱ The geo-engineering lobby is composed of scientists, corporations, think tanks, and individuals. For more background on who is involved see: ETC Group, the Emperor's New Climate: Geoengineering as 21st century fairytale, 28 August 2009, available at

http://www.etcgroup.org/en/materials/publications.html?pub_id=762 and Alex Steffen,

“Geoengineering and the New Climate Denialism,” 29 April 2009 at

<http://www.worldchanging.com/archives/009784.html>

ⁱⁱ For example, simply in the last three months: the UK Royal Society's “Geoengineering the climate: Science, governance and uncertainty” was released on September 1; the US National Academies sponsored a two-day workshop “Geoengineering Options to Respond to Climate Change: Steps to Establish a Research Agenda”, on June 15-16 2009; Novim published “Climate Engineering Responses to Climate Emergencies”, July 29 2009; in August 2009 Bjorn Lomborg's group, the Copenhagen Consensus Centre, published a series of papers in favour of geoengineering as the most economical climate response- details can be viewed at <http://fixtheclimate.com/component-1/the-solutions-new-research/climate-engineering/>.

ⁱⁱⁱ Both US Chief Science Advisor John Holdren and US Energy Secretary Steven Chu have floated some trial balloons on geoengineering in the past few months. See White Roofs, Black Dust And Slippery Slopes: Climate Engineers Seek Techno-fix As Global Negotiations Get Underway, ETC Group and Biofuelwatch, June 1, 2009 and Obama and Geo-engineering? Yes, you can – but don't!, ETC Group, News Release. 8 April 2009 and EU researcher: World needs geo-renovating rather than geo-engineering, Wednesday 9 September 2009 at <http://www.euractiv.com/en/climate-change/eu-researcher-world-needs-geo-renovating-geo-engineering/article-185285?Ref=RSS>

^{iv} See discussion in Geo-Engineering: Giving us the Time to Act, Institute of Mechanical Engineers (UK), August 2009, available at <http://www.imeche.org/>

^v See for example plans by Pacific Gas and Electric Company (California) to use cloud seeding in the Pit and McCloud Watersheds to offset snow pack loss from climate change – Christina Aanestad, “Seeding Clouds for Hydropower” Climate Watch, KQED Radio - <http://blogs.kqed.org/climatewatch/2009/09/05/seeding-clouds-for-hydropower/>

^{vi} See for example Geo-Engineering: Giving us the Time to Act, Institute of Mechanical Engineers (UK), August 2009, available at <http://www.imeche.org/>

^{vii} See for example, Novim, op.cit. pp. 6-7.

^{viii} UK Royal Society, “Geoengineering the climate: Science, governance and uncertainty”, September 1, 2009.